

CLAIMS

WE CLAIM:

1. An interface module for connecting a data communications link to a switching node, comprising a plurality of other such interface modules, of a data communications network, the interface module comprising:

an external port for connection to a data communications link;

a plurality of internal ports for connection to respective internal ports of said other interface modules of the switching node;

a link interface, connected to the external port, for processing inbound data for forwarding across the switching node and outbound data for transmission over said link;

a switch circuit, connected between the link interface and the internal ports of the module, for transmission of data between the internal ports of the module and between the internal ports and the link interface; and

a controller for controlling routing of data via the internal ports of the module in accordance with an intra-node routing protocol governing routing of data across the intra-node network of interconnected interface modules of the switching node.

2. An interface module according to claim 1 including a plurality of external ports for connection to respective data communications links, wherein the link interface is connected to each of the external ports for processing said inbound and outbound data.

3. An interface module according to claim 1 wherein the link interface comprises a communications adapter for format conversion between a link data format for the external port, for data communications over a link connected to the port in use, and a switch data format for data communications across the switching node.

4. An interface module according to claim 1 wherein the link interface comprises an external routing component for adding external routing information to data to be forwarded across the switching node in dependence on a destination address indicated by the data to be forwarded, said external routing information indicating an external port of one of said other interface modules of the switching node to which the data is to be forwarded.

5. An interface module according to claim 1 wherein the controller comprises an internal routing manager for maintaining

topology information indicative of the topology of the intra-node network, and an internal routing component for selecting, in dependence on said topology information, an internal port of the module for forwarding of data across the intra-node network in accordance with the intra-node routing protocol.

6. An interface module according to claim 2 including at least one external port which is connected or connectable directly to the switch circuit.

7. An interface card comprising an interface module for connecting a data communications link to a switching node, comprising a plurality of other such interface modules, of a data communications network, the interface module comprising:

an external port for connection to a data communications link;

a plurality of internal ports for connection to respective internal ports of said other interface modules of the switching node;

a link interface, connected to the external port, for processing inbound data for forwarding across the switching node and outbound data for transmission over said link;

a switch circuit, connected between the link interface and the internal ports of the module, for transmission of data

between the internal ports of the module and between the internal ports and the link interface; and

a controller for controlling routing of data via the internal ports of the module in accordance with an intra-node routing protocol governing routing of data across the intra-node network of interconnected interface modules of the switching node.

8. A switching node for a data communications network, the switching node comprising a plurality of interface modules for connecting data communications links to the switching node, wherein:

each interface module comprises at least one external port for connection to a data communications link, a plurality of internal ports, a link interface, which is connected to said at least one external port, for processing inbound data for forwarding across the switching node and outbound data for transmission over the link, a switch circuit, which is connected between the link interface and the internal ports of the module, for transmission of data between the internal ports of the module and between the internal ports and the link interface, and a controller for controlling routing of data via the internal ports of the module;

at least some of the internal ports of each interface module are connected to respective internal ports of one at

least one other said interface module whereby the interface modules are connected in an intra-node network;

and wherein the controller of each interface module is arranged to control said routing of data in accordance with an intra-node routing protocol governing routing of data across said intra-node network.

9. A switching node according to claim 8 wherein:

the switching node includes at least one switching module comprising a plurality of internal ports, a switch circuit for transmission of data between the internal ports of the switching module, and a controller for controlling routing of data via the internal ports of the switching module in accordance with said intra-node routing protocol; and

at least some of the internal ports of the switching module are connected to respective internal ports of one at least one said interface module, whereby the switching module is connected in said intra-node network.

10. A switching node according to claim 9 including a plurality of said switching modules, wherein at least some of the internal ports of each switching module are connected to respective internal ports of a plurality of the interface and switching modules in the intra-node network.

11. A switching node according to claim 10 wherein the switching circuit of each interface module comprises an electrical switch, and the switching circuit of the switching module comprises an optical switch.

12. A data communications network comprising at least one switching node according to claim 8, and a plurality of data communications links, connected to respective external ports of a plurality of the interface modules of the switching node, at least one of said data communications links connecting at least one network device to the switching node.